

## REAL-TIME ENERGY MONITORING HELPS BEAVERTON SAVE ENERGY

### SOLUTION OVERVIEW

Beaverton participated in a three year real time energy monitoring pilot program sponsored by the Energy Trust of Oregon (ETO), a non-profit that supports utility programs across the state. ETO provided the city with resources to install energy monitoring systems and utilize the services of an expert consultant. With this support, the city was able to identify low and no cost recommendations for energy savings.

This approach allowed Beaverton to achieve greater efficiency without the significant up-front capital to pursue large upgrade investments. City facilities technicians are now better able to identify trends, respond quickly to equipment malfunctions, and make changes in real-time resulting in optimal energy performance.

### COMMUNITY SIZE

Small suburban, population 90,000

### GOAL

A 20% energy reduction in municipal facilities by 2020 from a 2009 baseline

### BARRIER

Lack of access to consistent and transparent building performance data; lack of employee awareness of energy efficiency opportunities

### SOLUTION

The city used real time energy monitoring to more accurately identify, prioritize, and implement low and no cost energy savings measures (ESMs) at two city facilities - the Main Branch Beaverton City Library and Beaverton City Hall

### OUTCOME

Since implementing real time energy monitoring at the city library and city hall in 2012, the city is saving approximately \$35,000 annually. The two buildings have achieved 23% and 15% energy savings respectively based on 2014 energy performance data. In addition, city facilities technicians have received training on how to identify trends, respond quickly to equipment malfunction alerts, and track changes in real-time, resulting in optimal energy performance.

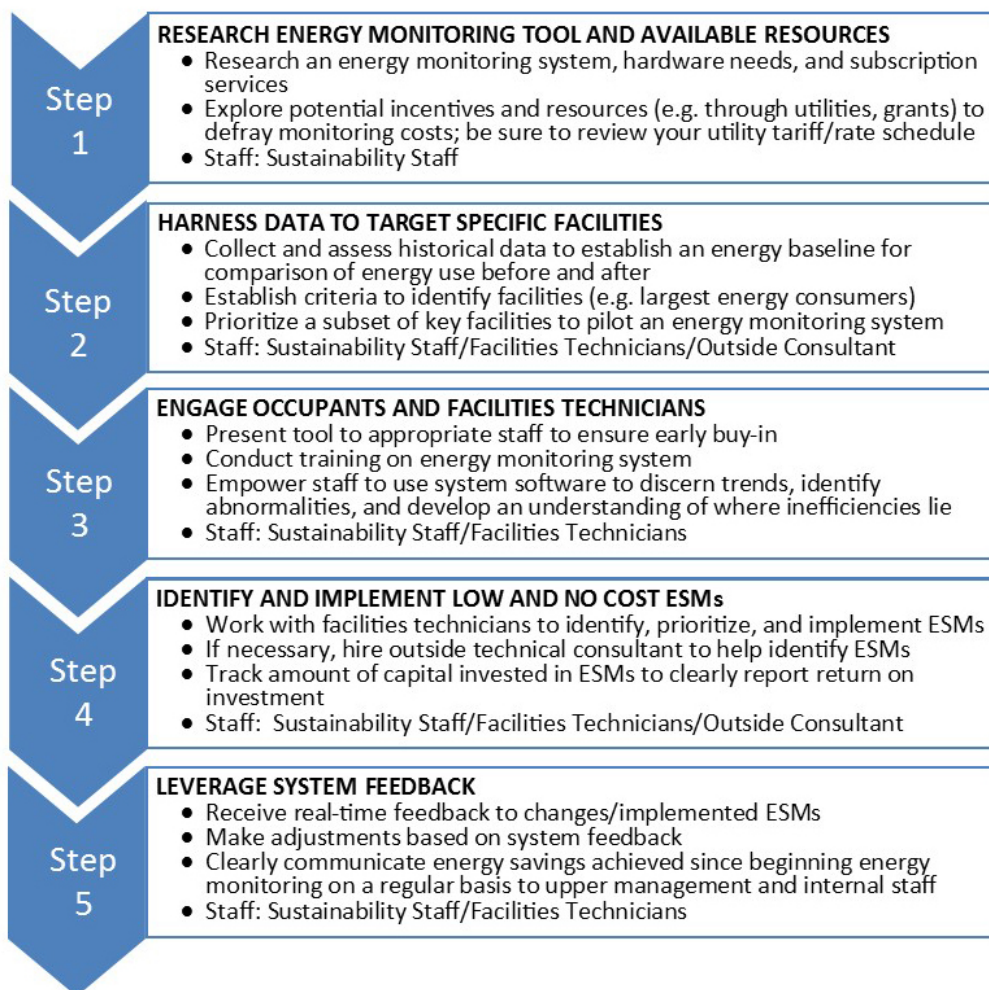
## POLICIES

Sustainable Beaverton Strategy 2014 is an internal strategy which established eleven goals and actions to enhance sustainability in day-to-day city operations and services. This strategy supports a city-wide goal to reduce energy use per full time employee by 20% from 2008 levels by 2020.

As part of the ongoing accountability for strategy implementation, the city completes an annual progress report to recount the progress the city is making. The energy monitoring pilot program is one of the key strategies the city is using to help identify the highest impact opportunities for energy savings.

## PROCESS

When implementing a real-time energy monitoring system, Beaverton identified the five major steps, described in the graphic below.



### Step 1: Research Energy Monitoring Tool and Available Resources

Beaverton fostered a strong partnership with ETO and local utilities, Portland General Electric and NW Natural, to participate in existing initiatives that could support the city's efforts to generate savings and improve efficiency of their buildings. These partnerships helped the city become aware of an incentive program focused on low and no cost energy savings measures sponsored by ETO.

ETO helped install real-time energy monitoring systems and provided active consulting support to help city staff identify low and no cost energy saving opportunities in two city facilities. The city paid approximately \$17,000 for three years of these services.

### **Step 2: Harness Data to Target Specific Facilities**

The city worked with a consultant to gather two years of historical data, analyze the data with a web-based software tool, and establish an energy baseline. The city targeted its city hall and main library because data showed these buildings to be the most energy intensive of all the buildings deemed qualified for real-time energy monitoring based on square footage, age, and energy savings potential.

### **Step 3: Engage Occupants and Facilities Technicians**

Early in the process, Beaverton worked with the library and city hall facilities technicians to ensure buy-in, conduct training on the new monitoring system, and determine feasibility of proposed ESM recommendations. Facilities technicians were taught how to use a web-based dashboard that provides energy data in 15-minute intervals, immediately identifies deviations from normal usage patterns, and tracks low cost energy saving measures through its "communicator" tool. Access to interval data has helped the facility technicians better understand how energy is used, and problematic areas are revealed and can be resolved more quickly. The immediate feedback loop allowed facilities technicians to identify trends, respond quickly to equipment malfunction alerts, make changes, and see impacts in real-time, resulting in optimal energy savings. The city did not need to hire additional staff to support these activities.

### **Tools and Resources:**

- [Summary of Monitoring System Process and Service](#)
- [Dashboard Training Guide](#)

### **Step 4: Identify and Implement Low and No Cost ESMs**

Through the pilot, Beaverton collaborated with a consultant to make ESM recommendations and calculate expected savings from implemented recommendations. The consultant first conducted an initial walk through of the two facilities and looked for low and no cost ESMs. A meeting was organized with sustainability staff and facilities technicians to share findings and elicit further efficiency recommendations. Facilities staff offered feedback on the feasibility of the recommendations, prioritized the recommendations, and were then tasked with implementing the measures. When an ESM was proposed, it was entered into the dashboard "communicator" by the consultant with estimated savings and completion status.

The city first focused on no-cost measures that could be implemented internally. Examples of these measures include reducing lighting hours and calibrating temperature control sensors. Next, low-cost ESMs with the highest return on investment that were already budgeted for the fiscal year were

pursued. Based on the recommendations and prioritization, temporary monitors were installed for temperature, lighting, and occupancy.

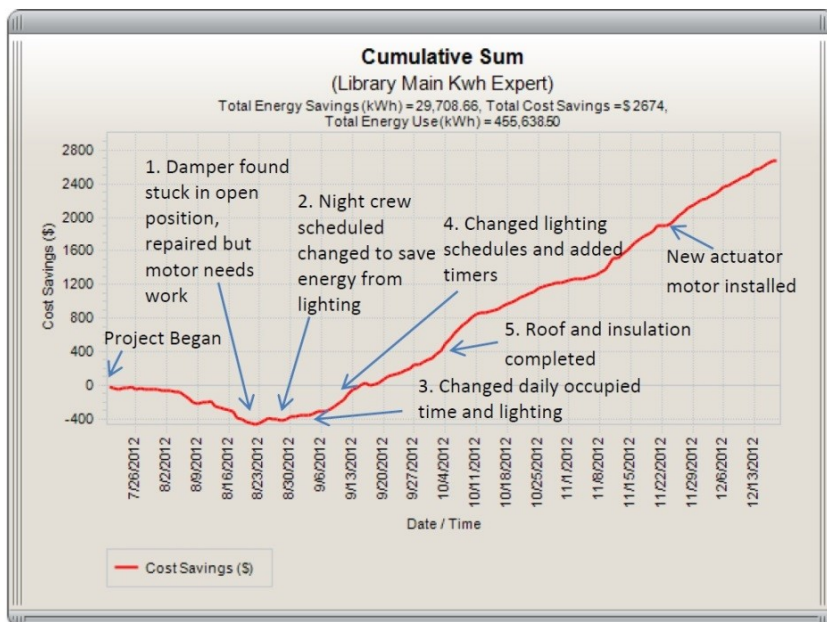
After this initial round of ESMs, the consultant provided continuous improvement guidance and a second walk through was conducted one year after to recommend additional ESMs.

### Step 5: Leverage System Feedback

Once the real-time energy monitoring was installed, the city was able to immediately view reports on building energy performance for each of the facilities. Facilities technicians and sustainability staff members log onto the web-based dashboard to access building energy performance and receive daily notifications of energy spikes or dips. Facilities technicians are notified almost immediately if a piece of equipment malfunctions which could lead to increased energy consumption if not addressed. The technicians are then able to make adjustments, see results immediately, and determine if further correction is needed. As a result, the city is seeing energy savings as building operating equipment is running on a tighter schedule relative to occupied and unoccupied times.

The sustainability staff leverages the outputs of the energy monitoring to communicate the effort's results to city leadership and employees. Sustainability staff provides on-going energy savings communication to internal city staff through the Sustainability Updates newsletter and provides a quarterly report to the mayor and senior management to ensure continued support.

The following chart illustrates the savings recognized over a 5-month period of time and corresponding energy savings measures implemented.



### Tools:

- ESM Details

- Quarterly Update to the Mayor
- Savings Report for Upper Management/Internal Staff
- All Staff Email from the Mayor Announcing Efforts
- Sustainability Updates Newsletter

## **OUTCOMES**

Real-time energy monitoring allowed Beaverton to better track facility energy use, identify and quickly respond to malfunctions in a meaningful timeframe, identify low-to-no cost ESMs, and analyze and report on the savings resulting from implemented ESMs.

Sustainability and facilities staff were able to track how changes in equipment settings and operating hours affected consumption and costs. For example, the monitoring showed when lights were left on, when a damper was stuck open, and other abnormalities that otherwise would not have been discovered as quickly.

The city has saved more than \$35,000 annually between the two facilities compared to the 2011 baseline year. In the year ending July 2014, the library and city hall achieved 23% and 15% energy savings respectively. The city is also considering expanding real-time monitoring to other facilities.



